

Project Delivery Efficiencies

PRELIMINARY DRAFT FOR DISCUSSION ONLY

This preliminary draft discussion paper is a work product developed by the consulting team for review and discussion by the Blue Ribbon Commission on Transportation. The contents are intended to provide the Commission members with factual background information and a balanced set of policy alternatives, including the pros and cons of these alternatives. This paper is one of a series and should be reviewed in the context of the entire series that, when taken together, present a comprehensive overview of the state's transportation system.

This discussion paper has been prepared primarily for Blue Ribbon Commission members new to these issues who wish to engage in a fundamental debate and for a more general audience of interested citizens who may wish to comment on the Commission's deliberations. This paper is intended to be provocative and to stimulate discussion of issues and options in this state. It questions the current ways of doing business, not for the sake of finding fault, but to allow consideration of other potential ways of thinking about transportation issues that might be appropriate in the future.

PROBLEM STATEMENT

Difficulties in permitting and decisionmaking can make delivery of transportation construction projects both time-consuming and expensive. In addition, the conventional design-bid-build process, in which the design process and construction contracting are separate, can extend the time frame and the expense for completing transportation projects. Governmental process requirements for delivery of public construction projects, instituted to make sure that public dollars are spent fairly and wisely and no mistakes are made, can be less efficient with time and resources than other possible approaches. Constrained financial resources, coupled with increasing needs for construction and maintenance, have led several states, including Washington, to seek efficiencies in providing and delivering transportation facilities.

OVERVIEW

Transportation agencies can create efficiencies within the traditional project delivery framework through enhanced team planning, commitment, and work schedule acceleration. A second set of project delivery tools, known as alternative project delivery (APD), involves more significant changes in the conventional methods of design, construction, and finance of transportation facilities. In many cases, the alternative approach involves innovative partnerships between the transportation agency and private sector providers of transportation facilities and services. Typical APD mechanisms include design-build

— in which the same team designs and constructs the project under a single contract with the agency — and variations on the design-build theme, such as design-build-operate and design-build-own-operate.

This discussion paper examines the experience of Washington State and other jurisdictions in creating project delivery efficiencies. The paper explores potential models for enhancing project delivery efficiency, ranging from improvements in the traditional project framework to alternative methods of project delivery. A case study of Interstate 5's South DuPont Interchange provides examples of streamlining project delivery within the conventional design-bid-build framework. Additionally, the paper examines the design-build method of construction, a common alternative project delivery tool, and discusses Washington's experience with two design-build pilot projects and its Public-Private Initiatives law. Finally, the paper reviews the use of alternative project delivery methods in other jurisdictions and discusses opportunities and challenges associated with applying such methods to future projects in Washington State.

STREAMLINING “CONVENTIONAL” PROJECT DELIVERY

Project delivery efficiencies can take place within the conventional framework. Efforts to streamline the permitting process, such as WSDOT's pilot projects and other examples described in the discussion paper on Permit Reform, represent one key approach to seeking project delivery efficiencies on transportation projects. Other efforts that can occur in the traditional project delivery framework include improved project management, enhanced team planning, and work schedule acceleration. The rapid repaving of Interstate 405 by the Washington State Department of Transportation, achieved through work on weekends, is an example of such efforts. The accelerated process used in designing and building the Interstate 5 South DuPont Interchange, discussed in the following section, also resulted in substantial cost and time savings.

I-5 SOUTH DUPONT INTERCHANGE

Although the project involved some unusual characteristics, the Interstate 5 South DuPont Interchange effort provides examples of ways to save time and reduce costs within the traditional project delivery framework. Intel Corporation's choice of DuPont, Washington, in Pierce County for a new research and manufacturing center depended on the fast-track construction of a new highway interchange on Interstate 5 to accommodate the plant's traffic. In response, the Washington State Department of Transportation (WSDOT) completed the interchange in 26 months, nearly two years faster than the 48 months originally estimated.¹

¹ For more detailed examination of the Interstate 5 project, see the report produced by Cambridge Systematics, *Department of Transportation Highways and Rail Programs Performance Audit*, Final Report, prepared for the State of Washington's Joint Legislative Audit and Review Committee, March 13, 1998 (known as the “JLARC Audit”), pp. 3-17. WSDOT's review of the project is contained in its *Interstate 5 South DuPont Interchange Design Process Report* (May 1997). Gary Demich, WSDOT Olympic Region Administrator, presented information on the project to the Administration Committee at its meeting on June 18, 1999.

The time savings resulted from several factors. Because an Intel plant in DuPont would benefit its planned Northwest Landing housing development, the Weyerhaeuser Real Estate Company (WRECO) financed the I-5 interchange project. This private sector funding gave WSDOT much more flexibility than available on publicly funded projects. This flexibility allowed the agency to conduct multiple processes simultaneously, rather than following the standard requirement of completing one step before moving on to the next. Prudent and legal risks were taken in advertising the project and commencing construction prior to obtaining all permits.

The South DuPont project also involved only three property owners — WRECO, Fort Lewis, and Burlington Northern Santa Fe Railroad — compared to a typical project in which right-of-way acquisition can involve many owners and take months to complete. In addition, since WRECO had previously identified the South DuPont Interchange as part of its traffic congestion mitigation plan for Northwest Landing, the company had already begun much of the work on access approval for alterations to the Interstate system. Furthermore, Northwest Landing's environmental impact statement and the City of DuPont's comprehensive plan already covered many of the environmental issues relevant to the proposed interchange. High-level political support also had a significant effect on the project. For example, the Governor secured the cooperation of other state agencies with WSDOT, and members of Washington's congressional delegation ensured the cooperation of federal agencies.

Despite the unique characteristics of the DuPont project, some of the innovations that cut in half its design and construction time could be applied to other transportation projects in Washington. These lessons including the following:

- *Beginning environmental review early in the project process*, and coordinating environmental considerations and design development as both proceed. In the South DuPont Interchange project, the environmental process began based on the preliminary project layout, which allowed it to start earlier than the typical procedure of waiting for the preliminary project design.
- *Using a more efficient design process*. The South DuPont Interchange project involved creating a new WSDOT design team dedicated to working exclusively on the interchange, rather than assigning the effort to an existing project engineer with other projects requiring attention. The DuPont project also involved streamlining design review, with high levels of coordination, elimination of redundant reviews, and parallel rather than sequential reviews. Additionally, the effort used staged submittals, with design proceeding based on engineering estimates when prudent, rather than waiting for complete data.
- *Including utility work as part of the construction contract*. WSDOT often includes water and sewer relocation in its contract work, but the agency rarely covers communication or power facilities. In the South DuPont Interchange project, however, participants agreed that the contractor would place utility vaults and a conduit for USWest's fiberoptic line relocation along the Fort Lewis Range Road. Including this construction in the contract reduced the risk of delays associated with scheduling work by other parties, such as the phone company.
- *Including options and greater flexibility as part of the construction contract*, instead of requiring contractor submittal and WSDOT approval of alternative methods. At DuPont, for example, several

alternative methods for constructing the retaining walls were made available to the contractor, in addition to the standard WSDOT cast-in-place wall. This allowed the contractor to bid any of the alternatives without having to take up valuable time by going through the standard WSDOT approval process for approving alternatives.

WSDOT currently is working to implement streamlined procedures for project development, and the agency is seeking to incorporate the lessons from DuPont that are replicable to other projects. However, much of the DuPont success depends on factors, like risk-taking, that cannot be replicated easily. The financial risk that Weyerhaeuser was willing to take in funding the project allowed WSDOT to alter its standard design process for managing publicly funded projects. In the DuPont case, Weyerhaeuser was willing to take the financial risk of running environmental, bridge design, and geometric design processes concurrently, giving WSDOT flexibility in allocating resources. In the private sector, the benefit of taking risks is the associated reward when the risks prove successful. The benefits were worth the risk to Weyerhaeuser because, without running parallel processes, WSDOT could not have achieved the 26-month schedule that supported Intel's decision to locate in DuPont.

In contrast, the standard public design process is intended to ensure that public funds are not spent on final design, contract plans, and right-of-way acquisitions until environmental documentation is complete. This standard process allows minimal risk and concentrates on completing one task at a time, in an effort to prevent mistakes. WSDOT's report on the South DuPont Interchange project discusses the issue of risk in the public and private sectors:

Why is the private sector willing to take such risks when the public sector is not? At least two reasons became apparent as work progressed on the South DuPont project. Private sector decisions recognize the time-value of money, and also recognize the value of time itself. Public sector decisions, for all practical purposes, recognize neither.

Private companies use a process that acknowledges small mistakes may happen, and corrects those mistakes as they proceed. They know that this will cost less overall than would using a longer process without mistakes. Public agencies, on the other hand, are held back by the fear of criticism and potential legal liabilities that might occur if a mistake is made.²

To take full advantage of project delivery efficiencies such as those at DuPont, public agencies would need to develop acceptable ways to manage the risk associated with conducting the phases of a transportation project concurrently.

ALTERNATIVE PROJECT DELIVERY (APD)

Many states, and to a greater extent other countries, are authorizing various types of alternative project delivery (APD) to use constrained financial and staff resources efficiently and to meet the public desire for responsiveness, timeliness, and accountability. APD can take many forms, ranging from innovative approaches to design and construction; to public-private partnerships with a mix of funding, ownership, and operating responsibilities; to major transportation improvements financed, owned, and operated by

² *Interstate 5 South DuPont Interchange Design Process Report*, p. 12.

the private sector and funded with user fees. Design-build is a key tool in the APD toolbox and is frequently a part of any APD or public-private partnership concerning transportation facilities. This section describes the Washington experience and that of other jurisdictions.

DESIGN-BUILD

Design-build means hiring a single entity for project design and construction, instead of the conventional practice, known as design-bid-build, of keeping the design process separate from the construction contracting. In the conventional process, a design is developed and completed, either in-house or through advertisement and consultant selection. Then the agency solicits contractor bids and awards a construction contract, typically to the lowest qualified bidder.

Design-build combines into a single contract the design and construction phases of a project. Long used in the United States and in Europe for constructing buildings, design-build has been used on transportation projects overseas for many years. Currently, 20 states are using design-build for some highway projects.³ Its advantages stem mainly from the designer-builder collaboration, which allows greater innovation and cost control. Research conducted into Florida's design-build pilot program of 11 transportation projects found significant savings over conventional design and construction projects. In the Florida study, the average design-build total project time was 35.7 percent shorter — 54 percent shorter in design time and 21 percent shorter in construction time.⁴ The maintenance of high qualification standards, which resulted in strong project teams, and the inclusion of project time among the major scoring criteria were credited for contributing to these time savings.

ALTERNATIVE PROJECT DELIVERY IN WASHINGTON STATE

In Washington, state laws addressing public contracting, including contracting for transportation projects, generally have required the design-bid-build process for project delivery. This process was instituted as the best way to ensure an open and fair process using objective and equitable criteria for the expenditure of public funds. WSDOT's normal contracting process is to develop the project design, advertise the project for bids, select the low bidder, and then monitor the construction of the project. This conventional approach keeps the design process separate from construction contracting.

³ The states are Alabama, Alaska, Arizona, California, Colorado, Florida, Georgia, Hawaii, Indiana, Maine, Maryland, Michigan, Minnesota, New Jersey, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, Utah and Washington. See *The Federal Highway Administration's Role in the Design-Build Program Under Special Experimental Project No. 14 (SEP-14)* (May 1999)(describing projects in each state).

⁴ University of Florida Department of Civil Engineering, Engineering and Industrial Experiment Station, *Evaluation of the Florida Department of Transportation Design/Build Program* (August 1991), p. 38-39. The report indicated that the average design-build direct cost was 4.6 percent greater, but found the cost comparison statistically inconclusive.

A 1997 study by Penn State University and the Construction Industry Institute looked at 351 projects, none of which was a transportation project, evaluating them based on cost, schedule and quality. Compared to traditional design-bid-build projects, design-build projects had six percent lower unit costs, 12 percent faster construction times, and 33 percent faster total project times (design and construction), according to the report. In addition, the design-build projects outperformed design-bid-build projects on every quality measure that the study examined.

WASHINGTON'S DESIGN-BUILD PILOT PROJECTS

In 1991, the Legislature authorized specified public agencies to enter into alternative public works contracting, including design-build, but this legislation did not include WSDOT. In 1998, the Legislature enacted SSB 6439, authorizing a test of design-build for transportation facilities to determine the advantages and disadvantages of this technique. The legislation authorizes the use of design-build contracting on highway projects over \$10 million where the construction activities are highly specialized and design-build selection is critical to the construction methodology; the project provides opportunity for greater innovation and efficiency between the designer and the builder; and significant savings in project delivery time would be realized. After an extensive process involving the public and stakeholders, WSDOT developed a design-build project process and selected two pilot projects from its existing State Transportation Improvement Plan. One is the State Route 500/Thurston Way Interchange in Vancouver, and the other is the Interstate 5/36th Street Undercrossing to State Route 539 in Bellingham.

Although these projects are in their early stages, WSDOT envisions that the design-build model will offer improved collaboration between the designer and builder and a shorter delivery time, with the possibility of beginning some construction prior to completion of the design work. WSDOT expects bid prices to be about the same or slightly more than under the traditional model.⁵ WSDOT will evaluate the final proposals based on a technical component as well as the price of the bid. In selecting design-build contractors, some other states simply pick the lowest bidder, but WSDOT plans to consider a combination of factors including technical ability, innovation, experience, and price. The technical evaluation will include consideration of the proposed work plan and schedule, management and organizational issues, and technical solutions.

If the experience of other jurisdictions is similar in Washington, the results of the pilot projects will be positive. The Federal Highway Administration has called design-build “a 21st century way of doing business and an ideal example of what commonsense government is all about.” As required by SSB 6439, WSDOT will evaluate the two design-build pilot projects and report its findings to the Legislature. The study will compare the actual project costs to estimated costs based on a design-bid-build model, and it will also compare the timeline and quality. If the pilots prove successful, WSDOT will recommend legal changes necessary to extend the design-build model to cover future transportation projects.

WASHINGTON'S PUBLIC-PRIVATE PARTNERSHIPS INITIATIVE

In 1993, the Washington State Legislature passed legislation authorizing public-private initiatives (PPI) to finance road, bridge, and other transportation improvements. The legislation was intended to provide opportunities for the state to develop transportation improvements using private sector financing and expertise and to supplement state transportation revenues for needed projects. By combining the strengths of the private sector with contributions from the public sector, the public-private framework

⁵ See Washington State Department of Transportation, *Design-Build Process for Highway Projects* (February 24, 1999). Rick Smith, WSDOT Design-Build Project Manager, made a presentation to the Administration Committee on June 18, 1999.

was meant to provide cost-effective and needed transportation facilities that lacked funding from traditional tax sources.

Following passage of the law, major national and international firms presented 14 projects believed to meet a need and to be economically viable for private investment. The Washington State Transportation Commission approved six proposals to move forward in the PPI process: added capacity on SR-16 over the Tacoma Narrows using toll facilities; new SR-520 HOV lanes across Lake Washington financed by tolls; an SR-522 tollway with new capacity and safety improvement between Woodinville and Monroe; and an SR-18 tollway with new capacity in southwestern King County.

Several of the proposed projects generated significant local opposition. In 1995, the Legislature changed the law to require an advisory election on any public-private toll facility that encounters community opposition, and it required WSDOT to consider the results of this advisory election in determining whether to proceed. WSDOT eliminated SR-18 from the program due to inadequate community support, and the requirements for an advisory election affected the proposed projects on SR-16, SR-520, and SR-522.

In 1996, the Legislature further required that the advisory election be on the preferred alternative resulting from an environmental review under state and federal laws. In addition, the Legislature made the advisory election contingent on the appropriation of funds by the Legislature to conduct the required technical, engineering, and environmental studies as well as to conduct the election itself. Of the three projects subject to the advisory election, the Legislature provided funding only for the SR-16 Tacoma Narrows project.

The value of the PPI approach derives in part from the design-build opportunity, as described earlier, with cost and schedule savings due to efficiency in having a single team for design, engineering, and construction, instead of multiple contracts.⁶ The project risks of design, construction, operation, and maintenance shift to the private sector partner. The private partner also provides financing, so the state has no increased debt. The public and private sector share the project development costs, and the public sector contributes to environmental studies and right-of-way acquisitions.

Following an advisory election in 1998 that favored the Tacoma Narrows proposal, the state negotiated a franchise agreement with United Infrastructure Company to finance, design, construct, and operate the SR-16/Tacoma Narrows project. The project schedule assumes completing the environmental impact statement, permitting, and executing a design-build contract in 1999; project financing and construction beginning in 2000; and the new facility opening to traffic in 2004-2005. The public contribution to the partnership will be \$50 million from the state transportation fund to “buy down” the tolled project cost; \$10 million in funding of environmental reports and public involvement processes; deferral of state sales tax payments; and business occupation and public utility tax exemptions. The private contribution will

⁶ Jerry Ellis, Director of the WSDOT Transportation Economic Partners Program, addressed a joint meeting of the Administration and Revenue Committees on May 12, 1999. She described the public-private initiative, focusing specifically on the Tacoma Narrows Bridge project.

be \$300 million in private debt financing, \$10 million in pre-financing costs, the design-build contract, and management and operations agreements.

The Tacoma Narrows project seems a good candidate for a public-private partnership in that the demand for the service provided is high and the project would not fit in WSDOT's normal 20-year planning horizon due to its size and cost. The state contribution is higher than when the project was selected in 1994, however. The ballot requirement changes the dynamics of contractual and financial partnership substantially, limiting the ability to do projects in the future, because the private sector will be less willing to undertake environmental processes and development costs in the face of an election with uncertain results. Attracting private involvement for future projects will require state funds as part of project development.

Public opposition has defeated several projects initially in the PPI pipeline, including the SR-520 project and the SR-18 project. Public opposition may be due not only to unwillingness to pay tolls but also to the private sector involvement. Community acceptance of private sector participation can vary. The general public and neighborhood groups may see it as a new tax burden on the community that unduly benefits the private sector. Yet private profit-making contractors perform public works projects all the time. Both the private provision of transportation improvements and the private financing of improvements have been part of the mix of the delivery of transportation services for many years in the United States. Much highway and road construction is contracted out to private contractors, though financed through traditional federal, state, and local public funding sources.⁷

ALTERNATIVE PROJECT DELIVERY IN OTHER JURISDICTIONS

As Washington's Public-Private Initiatives effort indicates, APD mechanisms go beyond design-build to include greater private sector involvement in project delivery. Although many states contract with private companies for highway maintenance functions,⁸ some states are starting to combine responsibility for design and construction with responsibility for maintenance of transportation projects. Having to consider future maintenance costs creates an incentive for designer-builders to develop innovative construction approaches that lead to transportation facilities with longer lives. In addition, with budget constraints preventing transportation expansions and improvement, states are looking for new financing tools and ways to expand the role of the private sector.

⁷ The evolution of private funding of transportation improvements is described in *Public and Private Partnerships for Financing Highway Improvements*, National Cooperative Highway Research Program Report 307, Transportation Research Board, National Research Council (June 1988), pp. 4-6. The same report also found that successful public-private financing partnerships depend on the presence of traffic congestion, rapid growth, strong economic conditions, and a supportive business community (pp. 3, 11-12).

Transit system operations also may be contracted out by government to private firms, and before the mid-1960s, most urban transit systems were private. Winston, Clifford, and Shirley, Chad, *Alternate Route: Toward Efficient Urban Transportation*, Brookings Institution Press, Washington, D.C., 1998, pp. 2, 91 & n.4.

⁸ See the companion paper on Operation and Maintenance Efficiencies for a discussion of contracting out of highway maintenance.

A survey that the American Association of State Highway and Transportation Officials conducted in 1997 found states reporting increased use of APD and public-private partnerships.⁹ More has been done overseas, however. Described below are some examples from other jurisdictions.

CALIFORNIA

In 1989, the California State Assembly authorized four demonstration projects of build-transfer-operate franchises. Under the law, the state would lease these franchises to developers for up to 35 years. CalTrans, the state transportation department, selected four projects, including the State Route 91 Express Lanes through the Santa Ana Canyon in the Los Angeles area. Following project development and financing, CalTrans executed a design-build contract with the California Private Transportation Company for delivery of the new express lanes. SR-91X represents the nation's first privately financed toll road of the postwar era. Opened in December 1999, SR-91X is 10 miles long, with four lanes built in the median of the existing public freeway. The California Private Transportation Company operates SR-91X and sets the toll rates, implementing variable pricing, depending on the time of day. The design-build arrangement helped facilitate completion of the project within budget and 13 months ahead of the CalTrans schedule.¹⁰

RICHMOND, VIRGINIA

In 1983, the Virginia Department of Transportation approved a corridor plan for the Route 895 connector in Richmond, Virginia, a limited-access highway that includes a crossing over the James River. Lack of funds put the project on hold. In 1995, recognizing that federal, state and local taxes would not satisfy the state's transportation needs, the Commonwealth of Virginia enacted a public-private transportation act that established a mechanism for private financing of public transportation facilities. With private financing and a design-build team, construction of the Route 895 connector, including a 670-foot main span bridging the river, began in October 1998 and is scheduled for completion in January 2002.

TORONTO, CANADA

The Highway 407 Express Toll Route is a 69-kilometer highway north of Toronto, Canada, which the Canadian Highways International Corporation (CHIC), a consortium of four construction companies, financed and built through a partnership agreement with the government of Ontario. CHIC designed, developed, and constructed the \$1 billion road, using toll revenues to finance the project. CHIC also

⁹ American Association of State Highway and Transportation Officials, *The Changing State DOT* (1998), pp. 31, 34-38, and Appendix A, Table VIII.

¹⁰ Jerry Porter, Engineering Manager with Kiewit Pacific Company, presented a case study of the SR-91X project at the Administration Committee's June 18th meeting. He also described the reconstruction of the Interstate 15 corridor through Salt Lake City, a design-build contract to rebuild 15 miles of freeway. Under the traditional design and construction timeline, the project would take 10 years, but the schedule was reduced to four-and-a-half years, for completion in time for the 2002 Winter Olympics. The design-build model facilitated the use of innovative construction techniques, such as using geofoam instead of fill dirt for freeway embankments. The Federal Highway Administration stated that the I-15 project "demonstrates that innovative methods . . . not only can save taxpayers dollars but also provide real benefits to millions of users."

operates and maintains the highway under a 30-year fixed price contract. Although original estimates predicted 110,000 daily trips for the first year, trips averaged 118,000 four months after the road opened, and drivers also chose to drive on the highway five kilometers farther than projected, further increasing toll revenues. Government officials estimate that the highway could pay for itself in 25 years, instead of the originally expected 30.

MELBOURNE, AUSTRALIA

Melbourne CityLink, Australia's largest urban road development, is a state-of-the-art \$1.8 billion expressway that will connect three major arterials. Designed, constructed, and operated by a private firm and funded with tolls, CityLink's ownership and operation will be transferred to the state after 34 years.

CONCLUSION

Project delivery efficiencies can take place within the traditional project delivery framework, through enhanced team planning and commitment and work schedule acceleration. The South DuPont Interchange project, which relied on private sector funding, demonstrated that appropriate risk-taking can save money and time. Where public dollars are involved, however, current safeguards and systems preclude similar risk-taking, such as proceeding with several phases of a transportation project concurrently. The current governmental systems for permitting, managing, and contracting public infrastructure projects have evolved over time, and they are intended to protect public resources and promote accountability. For public acceptability and political viability, efforts to streamline the project delivery process should maintain these public values. For public agencies to incorporate these ways of making transportation project delivery more efficient, policymakers need to develop acceptable ways of managing risks.

Alternative project delivery mechanisms, which change the conventional way transportation projects are designed, constructed, and financed, hold the promise of significant time savings. Although Washington State has laws on public contracting requiring the traditional design-bid-build approach, the Legislature has been innovative in authorizing alternative project delivery methods. WSDOT has begun two pilot design-build transportation projects authorized in 1998. Under the 1993 legislation authorizing public-private initiatives to finance transportation improvements, the SR-16 project over the Tacoma Narrows is moving forward. Examination of those projects, as well as alternative methods of project delivery in other states and countries, will help determine the potential benefits of project delivery efficiencies in Washington State.

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